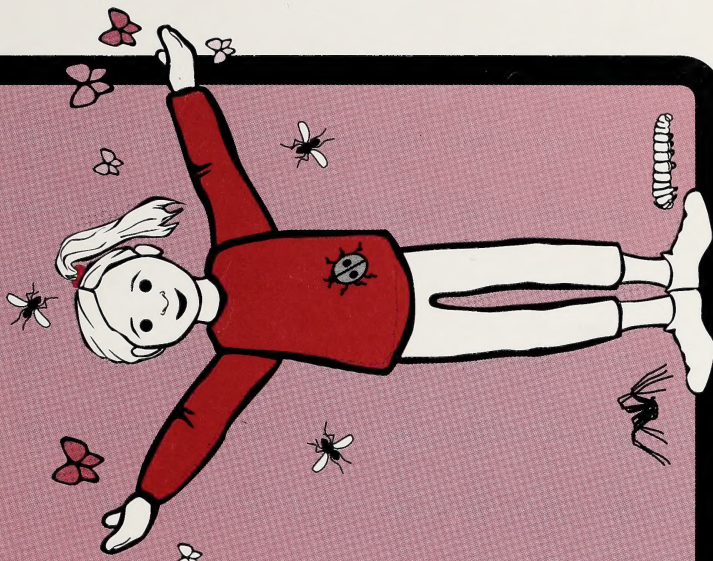


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Backyard Bugs



Special Interest Module

Grades 4-6





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Special Interest Module

Backyard Bugs

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This document is intended for	
Students	✓
Teachers	✓
Administrators	
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Welcome to

Backyard Bugs

Bugs have been living on Earth longer than any other animal. They were living on Earth when the dinosaurs were here. There are no more dinosaurs—but bugs are still around!

Bugs can live through almost anything. They are so small that they can fit into tiny places. They have many different ways of protecting themselves. They don't even need to eat much.

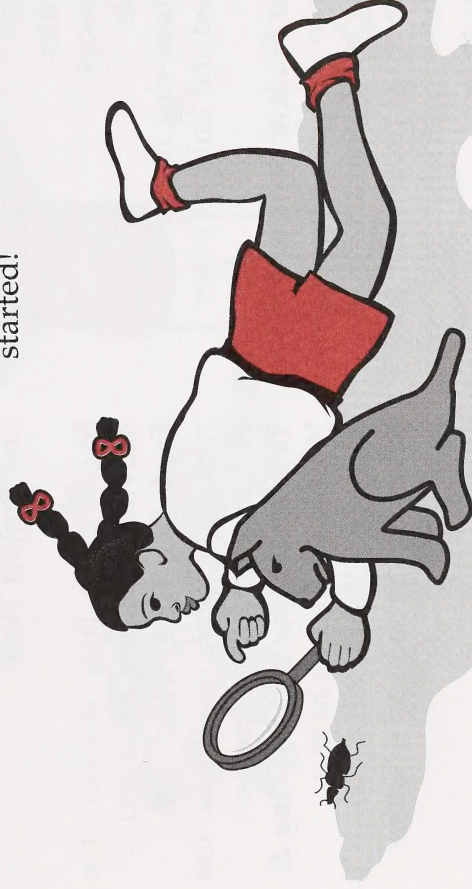
Bugs can be found in deserts, in jungles, in the ocean, and on top of mountains. They can even be found in your own backyard!

There are many interesting things to learn about bugs. In this module, you can observe them, feed them, study them, and even watch them grow! You'll discover the bugs in your backyard, read about them, and look at them in pictures.

If you have a computer, search for bug information on the Internet.

You'll also learn some big words!

First things first. Grab your magnifying glass and get started!



Before You Start

Get Ready

Before you begin working through the module, get your materials ready. You will need the following:

- coloured and lead pencils
- pens
- a ruler
- scissors
- glue
- a three-ring binder
- lined and unlined paper

Put your Student Book and the paper into the three-ring binder. You may need other materials for some of the projects. Be sure to get these materials before you start the project.

Mini Module Booklet and Student Book

The booklet you are reading now is called the **Mini Module Booklet**. It is divided into nine sections. Each section is divided into two parts: **Discovery Time** and **Project Time**.

In **Discovery Time**, you have the activities **Reading Time** and **Exploring Time**, where you read and explore new ideas. You also may have the activities **Talking It Over** and **Looking at Words**, where you have a chance to discuss what you have just learned and examine new words.

In **Project Time**, you are given two project choices; you will choose to do **one** of these. This is your chance to show what you have learned in a way that is fun and creative.

As you work through the module, you will be told to go to your Student Book. You will see the following icon telling you where to go:



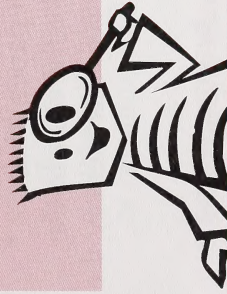
This icon will guide you back to this Mini Module Booklet.



So, now that you have everything ready, it's time to start *Backyard Bugs*.

Section 1

On the Lookout



Section 1: Discovery Time

Activities You Will Do

- Go on a bug watch.
- Talk about bugs.
- Draw a bug map.

Bugs live all over the world. They live in hot African jungles, in frozen Arctic lands, in rainy British Columbia mountains, and in Alberta prairies.

You don't have to go very far to find bugs. In fact, you don't even have to leave home. In this section, you'll go on a bug watch to find out which ones live in your own backyard!





Exploring Time

You've seen bugs before. There might be some in your home right now. They crawl in through the doors, buzz around the windows, and get a ride inside on your pet. Where do they come from? They probably come from your backyard!

Do you know how many different kinds of bugs live in your backyard? You'll find out. Get ready to go on a bug watch in your backyard, a vacant lot, a field, a forest, or even your favourite hideout.

Bug Watching Tips

Here are some ideas for better bug watching:

- Take along a magnifying glass.
- Be quiet.
- Be patient.
- Leave the bugs' homes as you found them.

First, get some paper, a pencil, and a clipboard to make notes and sketches of what you see. Take the **Bug Names** chart from your Student Book with you, too. It can help you name the bugs you find.

Decide how you will record your findings. You can draw or write, but first you'll need to make a **Bug Watch Chart** to organize your information.

Draw lines to make five sections on a piece of paper. Make headings, like the ones in the example, so you can identify the following:

- the names of bugs you found
- where you found them
- how many you found
- their colour or unusual markings
- what the bug was doing when you found it



STUDENT BOOK
Section 1
Exploring Time

Here are some places you could look for bugs:

- **in the air**
Look for bugs at different heights.
- **on plants**
Look carefully on flowers, underneath leaves, in buds, or on stems and roots.
- **on the ground**
Look for bugs hiding under leaves, rocks, doormats, and pieces of wood.
- **underground**
Turn over a clump of soil.
- **near buildings**
Look for bugs in dark or damp corners, by windows and drains, or other hiding places.
- **in water**
Look for bugs in puddles, ponds, or streams.

When you see a bug, draw or write its name on your **Bug Watch Chart**. Describe *where* you saw it. Count *how many* there are, if you can. What *colours* or *markings* does it have? What was your bug *doing*?

If you're not sure of the name of the bug, make a sketch of it. Later, you can use your Bug Names chart or look in a book for its name. If you have a camera, use it to take photos of the bugs, too.

After you have looked at bugs for about 30 minutes, go inside to finish off your **Bug Watch Chart**.

Turn to your Student Book and put in your completed **Bug Watch Chart**.



Bug Watch Chart				
Bugs	Where?	How Many?	Colour/ Unusual Markings	What was bug doing?
ladybug	on a leaf in the garden	1	red and black	
	in the garden dirt	3		



Talking It Over

Here are some questions to think about and talk over with your home instructor.

1. What do you know about bugs?
2. What was the most interesting bug you found? Describe it. What made it so interesting?
3. Where did you find the most bugs? Why do you think they live there?
4. Where did you find the fewest bugs? Why do you think this is so?



Writing Time

In this section, you are going to draw a **Backyard Bug Map** to show where you found each bug.

Take out a piece of unlined paper. Plot out the route you took on your bug watch.

Draw each of the places where you found a bug—for example, in the woodpile or in the compost.

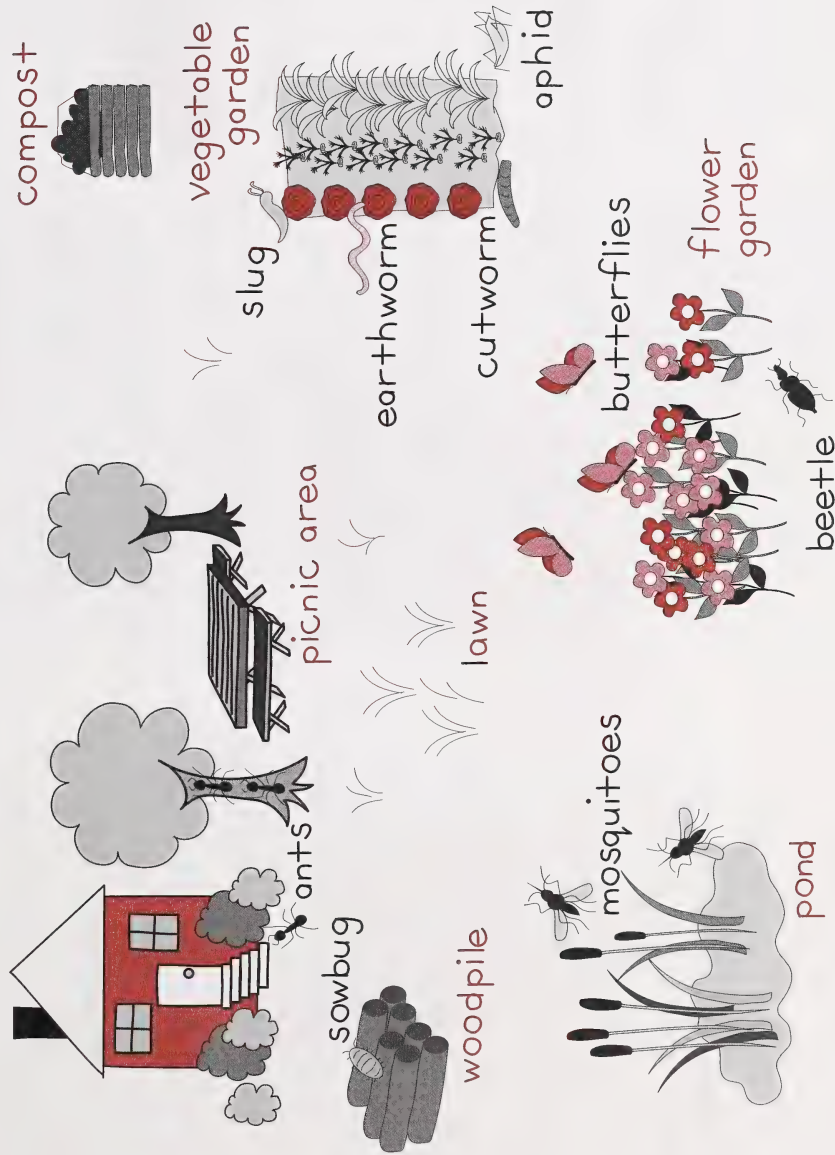
Print the name of the bug under each place, and then draw the bug.

Print neatly when you label your map or diagram. Colour in your map and your bugs. Make sure you use the correct colours for each bug.



When you have completed your map, put it in your Student Book. Label it **Backyard Bug Map**, Section 1: Writing Time.

Backyard Bug Map



On the Lookout



Section 1: Project Time

Choices You Have

- Make bug traps.
- or
- Observe small soil insects.

In Section 2, you will be asked to look at bugs more closely. To do this, you will have to “trap” some bugs. In your project, you will make equipment to catch some bugs.

Project Choice 1

Bug Traps

Subjects: Science/Practical Arts

Purpose: to construct bug-trap equipment

Using bug traps is a good way to catch bugs. It is a good idea to put something sweet in the bottom of your trap. Most bugs love sticky, sweet things to eat.

Before you go outside to set your bug traps, talk to your home instructor about where bugs live. Choose **three** different habitats to place your traps.

What You Need

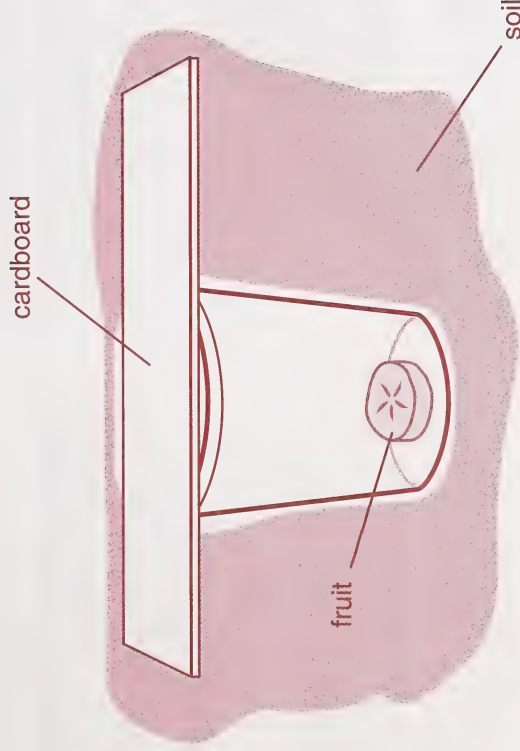
- three glass jars or plastic containers
- a piece of ripe fruit or some honey
- three pieces of cardboard
- several small rocks

What You Do

1. Dig a hole in the ground.
2. Place the jar or plastic container so that the top of the jar is even with the ground. Do not put the lid back on the jar.
3. Put your bug food inside the jar.
4. If needed, place rocks around the sides of the jar to hold up the jar.

5. Place the piece of cardboard across the top of the jar. You may need to put another rock on the top to keep the cardboard in place overnight.

6. When you have finished laying your bug traps, turn to your Student Book to describe or draw your bug traps.



Project Choice 2

Small Soil Insects

Subject: Science

Purpose: to construct equipment to gather insects that live in the soil

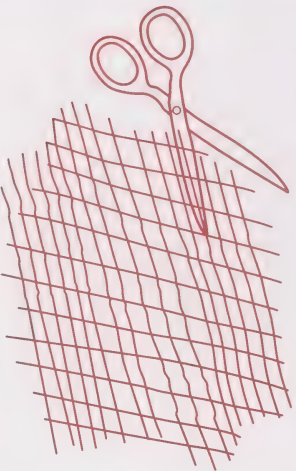
Many bugs live in the soil. Some—such as earthworms and beetles—are big enough to see easily. Many smaller insects are not. Here's a way to trap and gently separate small bugs from the soil so you can look at them.

What You Need

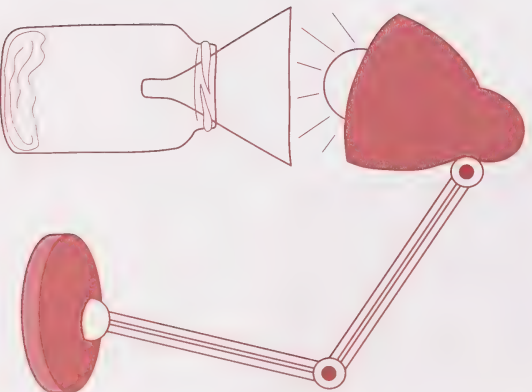
- soil and leaf litter
- lamp
- wire cutters
- funnel
- wide-mouth jar
- damp paper towel
- magnifying glass
- wire screening with large holes

What You Do

1. Collect some soil and leaf litter from a forest or garden. Then go back indoors and set up your equipment.
2. Place a piece of damp paper towel in a large jar.
3. Cut the screen to fit inside the funnel about 6 cm from the mouth. Put the funnel in the jar.
4. Place the soil over the screen in the funnel.



5. Position the lamp so it shines over the funnel, but is not touching it.
6. Turn on the lamp so that it shines on the soil. This works best if the room is dark.
7. Leave the lamp on for an hour or two—or overnight, if you have time. Notice that the bugs in the soil will move away from the heat and light and drop into the jar.



8. Switch off the lamp and remove the funnel. Tip the jar and gently tap it to move the bugs into a saucer.
9. Observe the bugs with your magnifying glass. How are they the same? How are they different?
10. When you've finished, return the bugs and soil to their natural habitat.
11. Repeat the experiment with soil from different habitats. Find out which kind of soil has the most bugs.
12. When you've finished, turn to your Student Book to make a list **or** draw a sketch of the bugs you found in the soil.



Home Sweet Home



Section 2: Discovery Time

Activities You Will Do

- Read about bug habitats.
- Answer a quiz.
- Collect or observe bugs in their habitats.
- Write about a bug habitat.

Did you notice how certain kinds of bugs prefer wet, dark areas, while others like the hot sun? In this section, you'll find out more about where bugs live and why they like to live there.

*If you are planning to do **Project Choice 1** in this section, collect the things you need while you're doing **Exploring Time**. Keep some bugs for a few days so that you can continue to observe them.*

On your bug watch in the last section, you may have discovered bugs almost everywhere you looked—on plants, in the soil, and in the air.





Reading Time

There are more than a million different kinds of bugs in the world. It's not surprising that there are many different kinds of places in which they live!

Bugs look for things they like to eat and that is where they choose to live.

Read the fact box called "Bug Habitats."

Then turn to your Student Book to do the **Match Me and My Habitat** exercise.



STUDENT BOOK
Section 2
Reading Time

Bug Habitats



A **habitat** (home) is a place where bugs naturally live and grow. Every living thing—including humans—has its own special habitat, with food, water, shelter, and space. A bug's habitat depends on what the bug needs to eat to stay healthy and safe.

Bug habitats can be found nearly everywhere in the world. Bugs live in people's homes; on animals; in air, water, and plants; and in the ground. Some bugs live in cold climates. Others prefer the hot desert or the jungle.

Look around for bug habitats in your own backyard, at the beach, and even inside your home. You might be surprised at what you find!





Exploring Time

Now it's time to take a closer look at some bug habitats. You'll look closely at the habitats where *your* bugs live.

If you made bug traps in Section 1, go and see what bugs you have collected.

Here are some ways for finding and collecting bugs:

- Hang an open umbrella under a tree branch. Gently shake the branch.
- Dig up small amounts of dirt from the garden. Place the dirt on a newspaper and spread it out.

Now go out and collect some bugs. Look in your bug traps to see what bugs have been collected there. Look at the bugs in each habitat and think about why they live there.

Decide how you will make your observations. You can take notes, make sketches, or do both. You'll be asked to write about your observations later.



Collect a few different bugs from each area. Put them in separate containers. Treat your bugs gently so you don't damage their legs or wings.

Be careful! Some beetles and spiders bite. Bees and wasps sting.

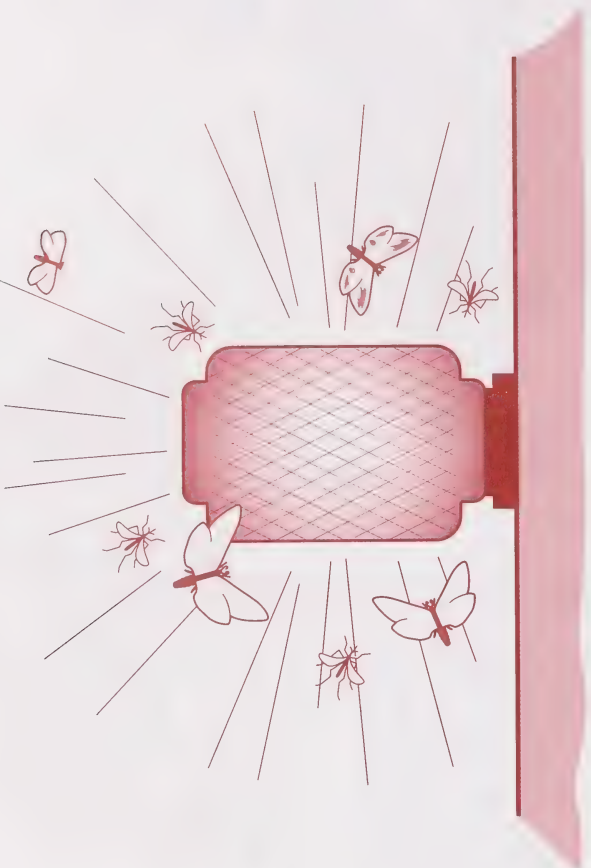
If you prefer, you can observe the bugs and then let them go.

If you've collected some bugs in containers, make sure to give them food and water. If you are using a jar with a tight-fitting lid, punch holes in the lid so that the bugs can breathe. Add a few leaves, some wood, or a bit of soil from the areas you find them in. Put your bug collection in a quiet spot out of direct sunlight or heat.

Remember to leave the environment just as you found it. Put rocks, logs, and pieces of wood back where they were so the bugs can find food and shelter.

Explore the "night world" for bugs, too. Turn on a porch light at night and see what bugs you attract. Have your jars ready to add some night flyers to your collection!

Another way to catch bugs at night is to spread something sticky, such as honey or syrup, on a tree during the day. At night, go back to the tree and take a flashlight covered with red tissue paper. Shine the light on the tree, and you should be able to see some bugs.





Writing Time

Now that you have collected your bugs, turn to your Student Book to describe **one** bug and its habitat. Draw a diagram of the bug, too.

If you have a computer, use it to write your description. Then put your work in your Student Book.

If you don't know the name of a bug, use the **Bug Names** chart to identify it.



Home Sweet Home



Section 2: Project Time

Choices You Have

- Make a bug home.
- or
- Make a bug diorama.

Project Choice 1

Make a Bug Home

Subjects: Science/Practical Arts

Purpose: to construct a model to observe bugs in their habitat

Do you want to watch bugs in their own habitat even when it's raining? You could create a bug habitat that you can keep inside!

What You Need

- a large pickle or relish jar
- tight-fitting lid
- nail (optional)
- hammer (optional)
- pebbles or sand
- small, untreated charcoal pieces (optional)
- soil
- bits of leaves
- piece of rotting wood

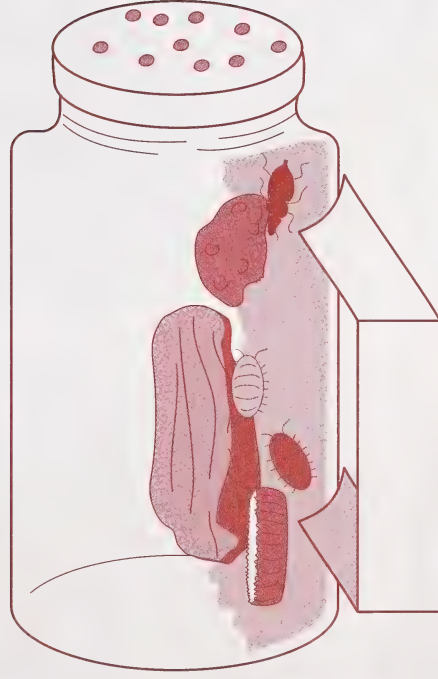
What You Do

1. Turn the jar on its side. Place a layer of small pebbles or sand in the jar for drainage. If you have some charcoal, sprinkle a thin layer over the sand. This will keep the soil fresh.
2. Add a layer of soil about 7 cm thick. Include some bits of leaves. Add a piece of rotting wood or a few stones.
3. Moisten the soil mixture—but don't make it too wet!
4. Dig up a few small plants and mosses. Press them firmly in the soil.

5. Ask your home instructor to punch a few air holes in the jar lid with the nail and hammer. Screw the lid on the jar.
6. Make a stand to keep the jar from rolling. You could cut a box lid to support it or place heavy objects, such as books, in front of and behind it.
7. Open the jar and gently add a few bugs that would like a soil or forest habitat.
8. Place the jar in an area where it will get some natural light and fresh air. Avoid direct sunlight and too much heat.
9. Check to see that the soil is moist, and add a few fresh leaves when needed.
10. Turn to your Student Book to draw and colour a picture of your bug habitat.



Remember to let your bugs go when you finish this module.



*Project Choice 2***Bug-Habitat Diorama***Subjects: Science/Art**Purpose: to construct a 3-D model bug habitat*

In this project, you can create an ideal bug habitat and ideal bugs!

What You Need

- empty shoe box
- scissors
- construction paper
- glue
- modelling clay
- crayons, paint, or felt markers
- sand, small rocks, branches, leaves (optional)
- toothpicks
- foil

What You Do

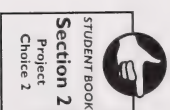
1. Cut open one side of the box. Then pull down the flap to make a “floor.”
2. Decide what kind of bug habitat you will make. What kind of plants will you need? Draw or paint the inside of the box to look like the habitat.

3. Add leaves, branches, small stones, and foil to create a 3-D habitat.

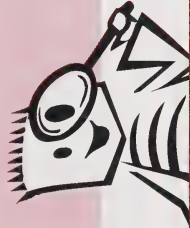
4. Make some bugs out of modelling clay. You could also use a drawing or magazine cutout and glue it to a toothpick. Stand up the toothpick with modelling clay. Add any other animals that might live in the habitat.

Use your *Bug Watch* notes and sketches for ideas.

Turn to your Student Book to write one or two sentences to describe your bug-habitat diorama. If you have a camera, take a photograph of your project, and then put it in your Student Book.



Who's Who?

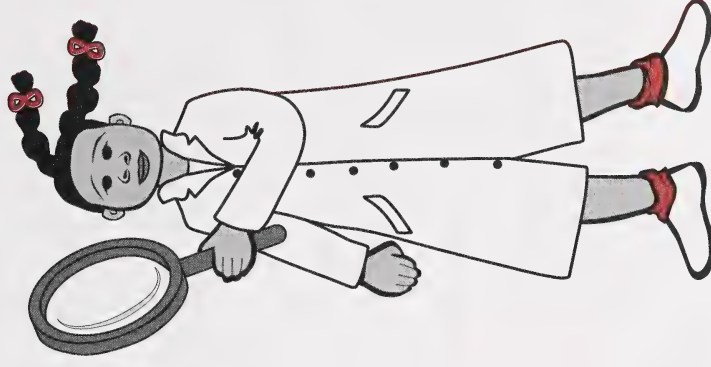


Section 3: Discovery Time

Activities You Will Do

- Read about classifying bugs.
- Classify bugs.
- Make a chart.

Most people call any small creature a bug. There's nothing wrong with that. Be careful what you call an insect though! Not every bug is an insect. An insect must have special characteristics to have that name. In this section, you'll find out what is an insect and what is not an insect.





Reading Time

Now that you've been out twice on a bug watch, you've seen a lot of bugs. Some of these bugs can be called insects—but which ones really are? It's not hard to tell when you know what to look for! Read the fact box called "What Makes a Bug an Insect?" to find out.

Did You Know?

Insects don't have bones in their bodies. They also don't have noses.



Exploring Time

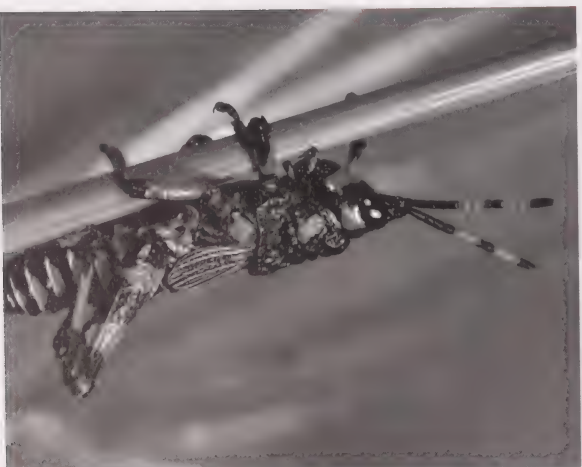
This is a good time to do some bug classifying. First, you'll need your **Bug Names** chart from Section 1. Cut along the lines of the chart so that you have 20 different bug cards. Classify these bugs into two groups—insects and non-insects. (Hint: There are many more insects than non-insects.)

Did You Know?

The scientific name for group is *phylum*.

Refer to the following checklist to make sure you have all your bug cards in the right groups. The bugs that are insects should have the following:

- ☐ six legs
- ☐ two antennae
- ☐ three body parts: head, thorax, and abdomen
- ☐ sometimes one or more pairs of wings
- ☐ hard outer covering (exoskeleton)



What Makes a Bug an Insect?

There are so many living things in the world that scientists had a hard time keeping track of all of them. So they decided to **classify** (organize) living things. They classified them into groups with similar characteristics.

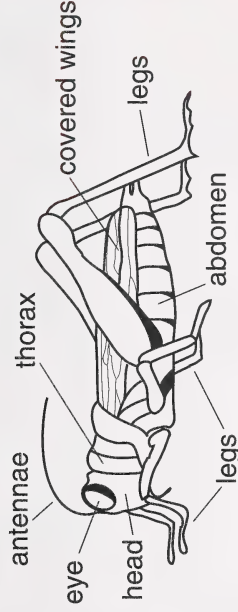
The scientists started by dividing things into two main groups named **plants** and **animals**. That made things easier. They decided that trees, flowers, and vegetables belong to the plant category. Cats, dogs, and horses belong to the animal category. Can you guess which category bugs belong to? (The answer is upside down below.)

Next, scientists divided the groups into smaller and smaller groups. One of these groups is **insects**.

Some bugs, like spiders, are often called insects—but they're not! They have different numbers of legs, wings, antennae, or body parts.

Insects are different from other bugs because they have

- six legs
- two antennae
- three body parts (head, thorax, and abdomen)
- sometimes one or more pairs of wings
- a hard outer covering called an exoskeleton



Answer: Bugs belong to the animal category.

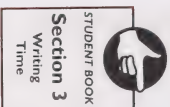


Writing Time

Now you can take a look at the bugs in your collection, in your bug home, or in your backyard. Can you tell who's who? Get out your magnifying glass to check.

How many legs, wings, body parts, and antennae does each one have?

Turn to your Student Book to classify **six** of your bugs on a chart.



Some of the bugs you find may not be adults. Some don't show their characteristics until they are grown up. You may need to do some research to find out if some of your bugs are young. Look in books and ask for help.

Check that the soil in your container is moist. Add a few drops of water or add a fresh leaf or two, if needed.

In the next few sections, you'll be looking more closely at the world of insects. Take the non-insects in your collection back to their natural homes and gently release them.





Talking It Over

Talk over the following questions with your home instructor:

1. How can you tell the difference between an insect and other small creatures?
2. How many of your bugs were insects? Were you surprised by this? Why or why not?

Entomologist

An **entomologist** is a scientist who studies insects. While you are working on this module, you're an entomologist, too!



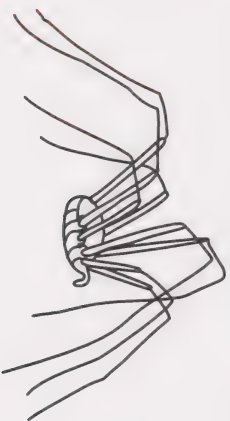
Who's Who?



Section 3: Project Time

Choices You Have

- Make a bug poster.
- or
- Create a collage about bug habitats.



Project Choice 1

Bug Poster

Subjects: Science and Visual Arts

Purpose: to present information in a poster

Many people think that spiders, and many other bugs, are insects. They're not! Now that you know who's who, you can make a poster to show others what an insect really is.



Choose **one** of the following:

- Make a diagram of an insect, labelling the characteristics that are common to all insects.
- Make a chart showing bugs that are commonly mistaken for insects.
- Draw and label pictures of several kinds of insects and non-insects found around your area.



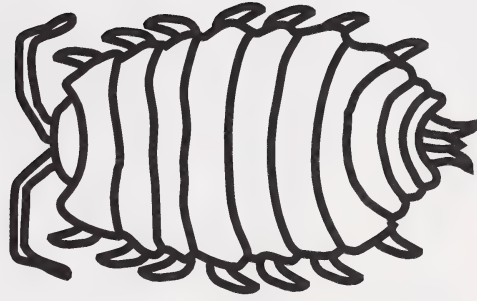
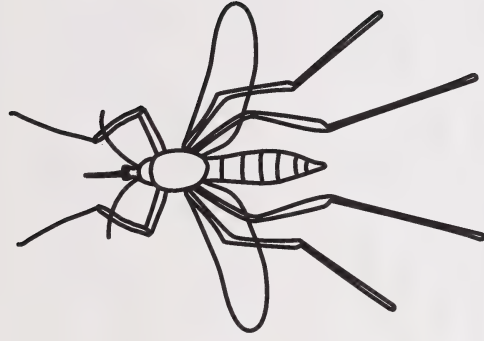
Cut out any words you need from coloured construction paper or use coloured felts or pencils.

Refer to books and magazines about insects to do a bit more research for your poster.

Use a full piece of unlined paper and lots of colour to make your poster easy for people to read. Remember, posters need only a few words on them.

When you have finished, print your name on the back and label it **Bug Poster, Section 3: Project Choice 1.**

Put your poster in your Student Book. You will send it to your teacher when you have finished the module.



*Project Choice 2***Tear into Bugs***Subject: Visual Arts**Purpose: to create a collage about bug habitats*

In this project, you can have fun tearing paper to make a bug collage. Think about the places you found your bugs. Did they live in the tall grass, under logs, or near a pond? Think about all the things you want to show in your picture.

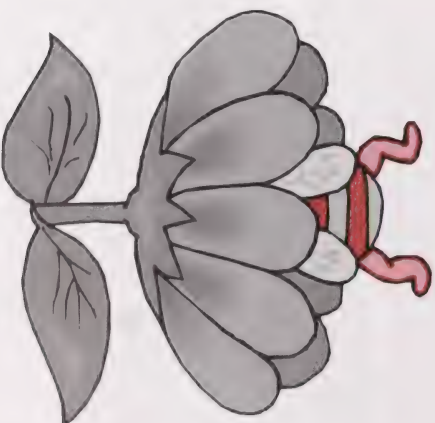
What You Need

- a sheet of unlined paper
- scraps of coloured paper or pictures from magazines
- scissors
- glue
- paints or coloured pencils

What You Do

1. Make the background first, using scraps of coloured paper. Tear the paper into the shape of long grass, flowers, logs, ponds, or any other objects that show where bugs live.
2. Tear coloured paper or pictures from magazines into bug shapes. You may even find pictures of insects that you can use.
3. When you have torn all the background and bug shapes you need, place them on a piece of unlined paper. Do not glue them on yet.
4. Arrange your bug shapes on the top of your background pieces.
5. Keep moving your shapes around until you are satisfied with the picture.
6. Carefully take off each piece and paste it in place.
7. Add other details with paints or coloured pencils after you have finished pasting all the pieces to the page.

Put your name on the back of your collage, and label it **Tear into Bugs, Section 3: Project Choice 2**. You will send it to your teacher when you have finished the module.



Section 4

Insects Up Close



Section 4: Discovery Time

Activities You Will Do

- Read about insect body parts.
- Observe some more insects.
- Draw and label an insect.

As you found out in the last section, all insects have similar characteristics. For example, they have similar body parts. Also, every insect has *specially adapted parts* suited to its habitat. In this section, you'll find out more about the different body parts and what they are used for.





Reading Time

Do you remember the parts of an insect that you discovered in the last section? An adult insect has three body parts—a head, a thorax, and an abdomen. It has six legs, two antennae, and an exoskeleton, too. Most insects have wings.

Each kind of insect also has special things about its body parts to help it find food, eat, protect itself, and **reproduce** (produce young insects). To find out more, read the fact box called “Insect Body Parts.”



Talking It Over

Talk over the following questions with your home instructor.

1. Which insect do you think has the best advantage—one that flies or one that crawls? Why?
2. Name two insects that hop and two that fly.
3. Which insect body did you find most interesting?



Insect Body Parts

Insects have developed different body parts to fit their way of living.

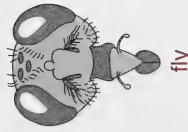
Head

The **antennae** (feelers) on an insect's head help it find where it is and what food is close. Some insects smell, taste, and even hear with their antennae.



chewing, licking, cutting, sucking, and piercing.

Insects also have two different kinds of eyes. Large eyes, called **compound eyes**, are good at seeing movement. Small eyes, called **ocelli**, adjust to the light.



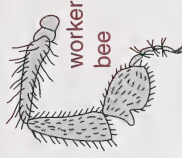
Thorax

Insects have different types of legs, depending on the way they move around. There are legs for jumping, swimming,



Insects have different types of mouths, depending on the food they eat. There are mouths for biting,

crawling, grasping, and combing pollen. Wings help insects search for food and escape from enemies.

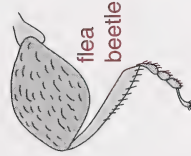


Abdomen

Food is digested inside the abdomen. Eggs are made inside the abdomen of female insects. A few insects have a stinger at the end of the abdomen to protect themselves or to get food.

Exoskeleton

Insects don't have bones. They have a tough outer covering called an exoskeleton.





Exploring Time

What do the body parts of the insects in your backyard look like? If you have a bug collection or a bug home, look at some of your insects right now. If not, go outdoors on another bug watch.

Use your magnifying glass to look at the mouth, body parts, antennae, legs, and wings of each insect. Here are a few questions to think about as you are looking.

- How is the mouth made to help each insect eat its food?
- What size are the eyes? Do you think some insects use their eyes more than others?



- Do the antennae look the same or different? Why might this be?

- Are some parts of the legs different sizes? Why do you think this is so?

- Do they all have wings? How do you think this affects the way each insect travels?

Choose **one** of the insects that you observed. Then turn to your Student Book to make a close-up drawing of your insect, showing all the body parts, and to write about **two** specially adapted parts.



STUDENT BOOK
Section 4
Exploring Time

Insects Up Close



Section 4: Project Time

Choices You Have

- Make a model insect.
- or
- Do an experiment.

Project Choice 1

3-D Insect

Subject: Visual Arts

Purpose: to create a 3-D model

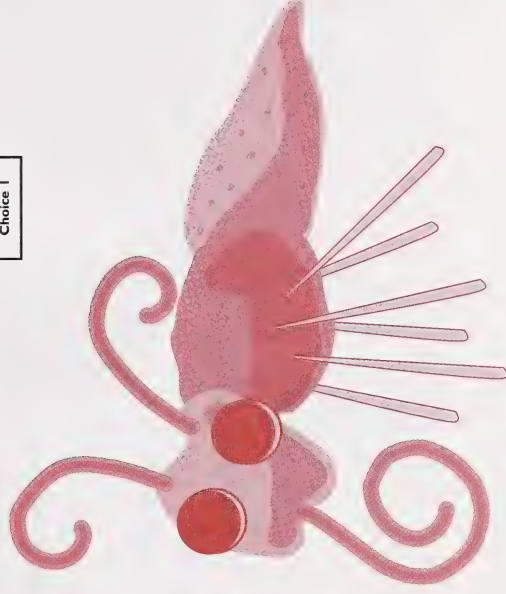
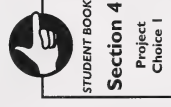
You've looked at insects and you've drawn them. Now you can create a 3-D model of one. Choose your favourite insect!

Use modelling clay, small boxes, cartons, pipe cleaners, fabric scraps, or other objects around your home. Start with the three basic body parts. Then add

extra details. What kind of specially adapted parts does your insect have?

You can make two or three different kinds of insects. Experiment with your materials and ways to make an insect model. Use different colours.

When you've finished, turn to your Student Book to describe or draw a coloured sketch of your model.



Project Choice 2**Bug Food****Subject:** Science**Purpose:** to experiment, observe, and record information

In this section, you found out that insects have mouth parts that are adapted to the kind of food they eat. What do the insects in your collection eat?

In this project, you will look at how ants eat.

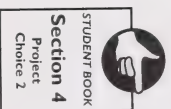
What You Need

- a large piece of paper (A piece of poster board would work well.)
- four rocks or heavy objects
- crackers
- a magnifying glass or binoculars
- a notebook
- a pen

What You Do

1. Find an anthill.
2. Lay the piece of paper on the ground with one end touching the anthill. Put the rocks on the paper to hold it down.
3. Crumble the crackers, and put them on the end of the paper opposite the anthill.
4. Using the magnifying glass or binoculars, watch the anthill. Record what you see.
5. Wait for at least half an hour and then record what you see.
6. Then turn to your Student Book to comment on your experiment.

Try some other foods, such as cheese, jam, or peanut butter, to see what the ants might do. See what happens when you place a stick or some other obstacle in the ants' path.



Section 5

Growing Up



Section 5: Discovery Time

Activities You Will Do

- Read about insect life cycles.
- Draw an insect's life cycle.
- Look at insect words.

Insects go through the same stages of life as you do. They begin their lives as babies, develop into young insects, and eventually become adults. The changes insects make during their lifetime is called **metamorphosis**.

Think how you've changed since you were a baby. Think how you'll change as you grow older. As you'll find out in this section, metamorphosis can be an even bigger change for insects!





Reading Time

For most insects, life starts inside an egg. Insect eggs are protected by hard shells, and although they are tiny and hard to see, they are often laid in great numbers.

In most insects, the animal that emerges from the egg looks different from its parents. It has no wings and it may not even have legs.

As they mature, young insects undergo a change of shape.

Read the fact box called “Metamorphosis” to discover how young insects become adults.



Writing Time

Choose **one** of the insects from your collection, your bug home, or your backyard.

Turn to the Student Book to draw a well-labelled diagram of this insect’s life cycle.

Remember, some insects do not go through all four stages of development.

Then do a word study.



STUDENT BOOK
Section 5
Writing Time

Check to see that your insects have food and water in your bug home.



Metamorphosis

The life cycle of an insect is called metamorphosis. Some insects, such as beetles, flies, and butterflies, go through complete metamorphosis. Other insects, such as grasshoppers, crickets, and dragonflies, go through incomplete metamorphosis.

Complete metamorphosis has four stages: egg, larva, pupa, and adult. Look at the complete metamorphosis of a butterfly.



1. **Egg:** The young insect is hatched.



2. **Larva:** The young insect eats and grows. It changes its skin (molts) several times.



3. **Pupa:** The insect then spins a cocoon around itself. The adult insect begins to form inside the cocoon.



4. **Adult:** The insect emerges (comes out) from the cocoon as an adult.

Incomplete metamorphosis has three stages: egg, larva, and adult. Look at the metamorphosis of a grasshopper.



1. **Egg:** The young insect is hatched.



2. **Larva:** The young insect eats and grows. Wing buds begin to form. The insect grows and begins to look more like a grasshopper.



3. **Adult:** The insect is at its full size and it has full wings.

Growing Up



Section 5: Project Time

Choices You Have

- Make a model of a butterfly using fruit.
- or
- Observe and record an insect's life cycle.

Project Choice 1

Fruit Butterfly

Subject: Practical Arts

Purpose: to make a model, using fruit

Here is a chance for you to use your imagination and some delicious fruit to create a bug of your own!

What You Need

- one small banana
- one apple
- raisins
- dried noodles (optional)
- lettuce leaves
- food colouring (optional)
- toothpicks

What You Do

1. Slice the banana in half and lengthwise. Then place it on a lettuce-lined plate.

2. Slice the apple in half. Cut each half of the apple into thin slices.

Dip the apple slices in lemon juice so they won't turn brown.

3. Decide if you want to have the peeled side of the apple "wings" showing or not.

4. Insert a toothpick into each "wing" slice and then into the slice of banana.

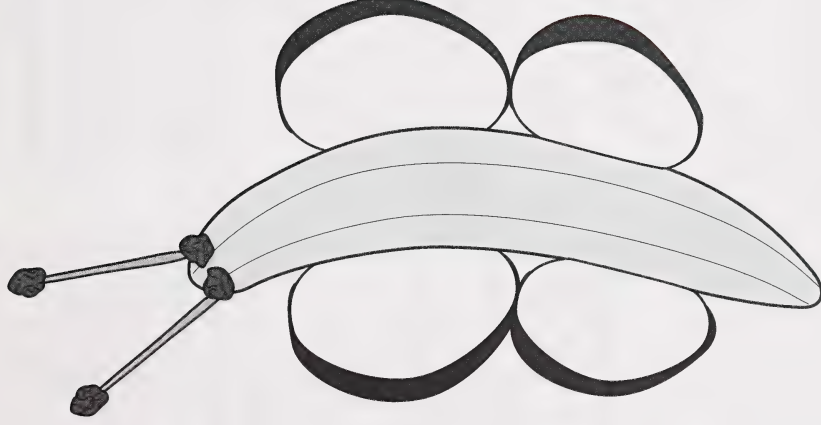
5. Push the raisins into the top of the banana to make "eyes."

6. To make the antennae, use either toothpicks or dried noodles. Insert the toothpicks or noodles into the banana above the raisin eyes. Place a small piece of raisin on the top of each antenna.

7. If you didn't use the peel side of the apple for the wings, use some food colouring to make markings on the butterfly's wings.

You're done! Stand back and admire your beautiful creation.

8. Turn to your Student Book to briefly describe how you enjoyed making a fruit butterfly and to draw a sketch of your fruit butterfly.



Project Choice 2**Mosquito Motel****Subject:** Science**Purpose:** to observe and record an insect's life cycle

If there are ponds or swamps near your home, you can study the life of a mosquito!

Mosquitoes can be pests—but they have a very interesting life cycle. The female mosquito lays her eggs in warm weather in ponds and swamps, in puddles, or in containers of water. The eggs are tiny and sometimes stick together. The larvae hatch in a few days and grow underwater.

Go on a field trip to find a pond or some swampy water. Ask an adult for help to find a good place to look for mosquitoes.

Scoop up some eggs or larvae (along with some water) in a glass jar. Keep them for a while and you'll see them change.

Put a lid with small holes or fine screening on your jar—or you'll have mosquitoes flying all over your house!

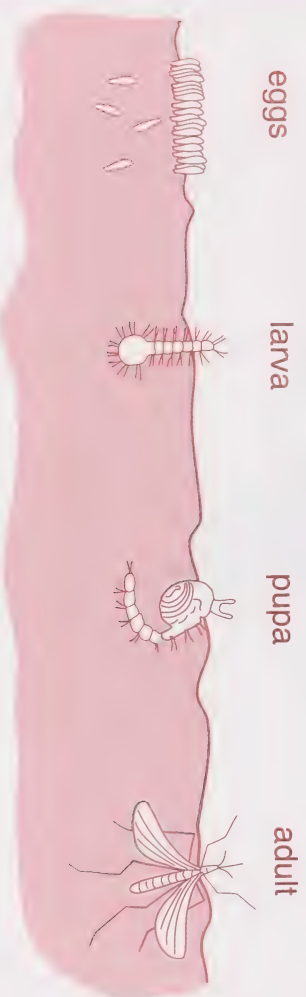
Observe the larvae with a magnifying glass. Can you see how they breathe? Do they move? What do the pupae (more than one pupa) look like? How long do you think it will be before they turn into adults?

Mosquito Mothers

Did you know that only female mosquitoes bite? It's true! They aren't looking for food for themselves—it's for their eggs. Blood contains special proteins that mosquito eggs need to grow.

Keep track of what happens! You will need to observe your mosquitoes for a few days to notice any changes.

You can let your teacher know how your mosquitoes are developing when you answer questions in Wrap-up Time in Section 9.



Section 6

Hide and Seek



With enemies all around them, insects need to protect themselves. One way they do that is with **camouflage** (colouring that looks like their surroundings). Insects have many interesting ways of protecting themselves, as you'll find out in this section.

What do birds, bats, fish, and frogs have in common? They're all animals that like to eat insects! Some insects even eat other insects.

Section 6: Discovery Time

Activities You Will Do

- Read and watch how insects protect themselves.
- Compare different kinds of insect protection.
- Complete an insect comparison chart.
- Write insect questions.





Reading Time

There are billions of insects in the world. There are also many hungry animals who eat insects! Insects have some special ways to protect themselves from hungry enemies.

Read the fact box called "Insect Protection."



Talking It Over

Here are some questions to talk over with your home instructor.

1. Describe some ways that insects protect themselves. Which way do you find the most interesting?
2. What insect enemies have you seen in your backyard?



Exploring Time

Now it's time to look at the insects from your backyard and see how they protect themselves. Then you will record your observations.

Look at your insect collection or bug home; or, go outside on another bug watch. Find several kinds of insects. Choose five insects to write about.

Turn to your Student Book to record your findings on the Insect Protection Chart.



STUDENT BOOK
Section 6
Exploring Time

Insect Protection

When insects are in danger, they have three choices:

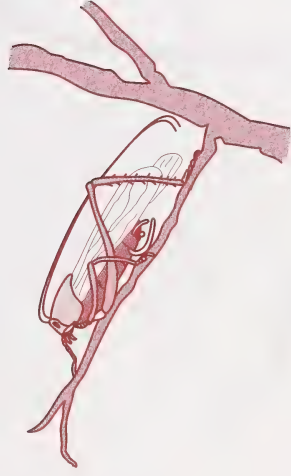
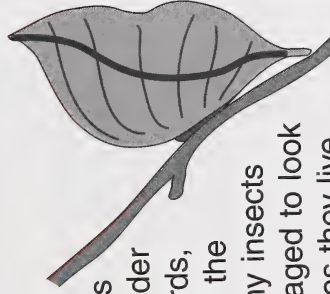
- They can escape.
- They can hide.
- They can defend themselves by fighting back.

Escaping

If an insect can move quickly, it gets away from an enemy. Grasshoppers have strong jumping legs to help them get away from enemies. Flies have wings to fly quickly from one spot to another. Other insects crawl, run, or hop away from danger.

Hiding

Small insects often slip under stones, boards, and holes in the ground. Many insects are camouflaged to look like the places they live in. They have colours, patterns, and shapes that make them difficult to see. Some look like leaves, twigs, or sticks. Some insects even roll themselves up in leaves.



Defending

Some insects protect themselves by stinging or biting. Others give off an unpleasant smell to scare away enemies. Most insects have an extra-tough exoskeleton to protect them.

Many butterflies and moths have spots on their wings that look like large eyes to frighten away birds.

Some insects have warning colours—black and yellow, orange, or red. These colours warn other animals that the insects taste bad if eaten or that they have a stinger.





Writing Time

Imagine you're a world-famous entomologist. People from all over the world know that they can find out about insects from you.

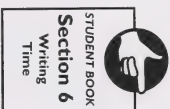
On a piece of paper, make up **two** questions that people might ask you. Use information that you found in the fact boxes from other sections and the things you found out about insect protection to answer the questions.

Check your questions and answers. Do they make sense? Are they written in complete sentences?

Proofread your work to make sure sentences start with a capital letter and end with a period or question mark. Make changes, if necessary.

Turn to your Student Book to write a final copy of your questions and answers.

Remember to give the insects in your collection or bug home fresh food and water, if they need it.



Q: Do all insects sting or bite?

A: While some insects sting or bite, most are harmless. Some look dangerous to protect themselves.

Try This!

Insects aren't the only ones who hide! How many words can you find "hiding" in the word *metamorphosis*?

Here are two words: *team* and *haste*. How many more can you find?

Invite other family members to join in. See who can write down the most words in five minutes!

Try finding the hidden words in *camouflage* and *entomologist*, too.

Hide and Seek



Section 6: Project Time

Choices You Have

- Make a camouflage picture.
- or
- Play a camouflage game.



Project Choice 1

Camouflage

Subject: Visual Arts

Purpose: to represent ideas in a drawing

Some insects are lucky. They look so much like where they live that they just stay still when an enemy comes near. If the enemy can't see them, they can't get caught!

Camouflage is good protection. It makes an interesting picture, too. Draw, paint, or make a collage of insects blending into their surroundings. Can you see insects hidden in the leaves and grass?

Gather up your materials and get started! Give your picture a title.

When your picture is completed, turn to your Student Book to describe your picture.



If you have a camera, you might like to take a photograph to put in your Student Book, too.



Project Choice 2

A Camouflage Game

Subject: Practical Arts

Purpose: to apply knowledge while playing a game

Insects can be very hard to see. One second they're there—the next minute they're not! Find out how difficult some things can be to see when they blend in with the environment.

What You Need

- coloured construction paper (Try to have all of these colours: black, white, brown, red, orange, green, and yellow.)
- scissors
- string (optional)
- four pencils or stakes (optional)

What You Do

1. Cut four small pieces of each colour of construction paper. Each piece should be no larger than 5 cm by 5 cm.
2. Find an area outside that is about 5 m by 5 m. It should have grass in it. It can also have trees, plants, or soil in it. If you want, use the pencils or stakes and the string to mark it off.
3. Hide the pieces of paper in the area. Make sure you know how many pieces of paper you have hidden.
4. Ask friends or family members to come to the area and find the pieces of paper.
5. The person who finds the most pieces of paper wins.
6. When you have finished, turn to your Student Book to comment on your game.



STUDENT BOOK
Section 6
Project
Choice 2



Section 7

Social Insects



Section 7: Discovery Time

Activities You Will Do

- Read about social insects.
- Begin an insect report.

People are social animals. They live together—in families and communities—and help each other. Some people grow food, other people build houses, and some people make clothes.

Some insects live together and help each other, too. Do you have any social insects in your backyard?





Reading Time

Over the last few days, you may have watched ants help each other carry a heavy load. Maybe you've seen a bee buzz around in a circle dance. These insects are sharing work and information with members of their community. Read all about it in the fact box called "Busy Social Workers."

If you want to know more about social insects, these are some topics you could look for in books and magazines or on the Internet:

- different kinds of wasps, bees, and ants
- nests of different social insects
- social ants
- honeybees



Talking It Over

Talk over the following questions with your home instructor.

1. Insects in a colony live and work together. Give some examples of their jobs.
2. What would be some advantages of living in a colony? What would be some disadvantages?
3. Why do you think only some insects live in colonies?

When you have finished with these questions, check the insects in your collection or bug home.

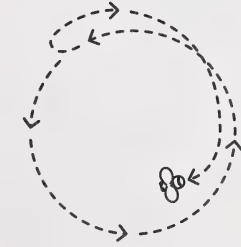
Busy Social Workers

Many insects like to live on their own. Others—like termites, aphids, and some kinds of ants, bees, wasps, and beetles—prefer to live together in a **colony** (community).

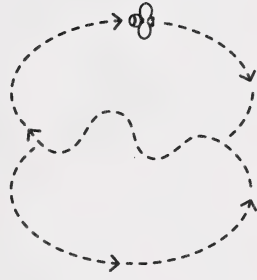
Each insect has its own special job to do. In the colony, there is usually one queen, whose only job is to lay eggs. Males mate with the queen so that her young insects can be produced. All the other work is done by workers. The workers look after the queen, build nests, find food, and take care of the young.

Bees

A hive (honeybee colony) may contain from 35 000 to 60 000 bees. The hive is made of wax combs, which are used to store food and raise young bees. When a worker bee finds nectar, it will do a dance to let other bees know where it has found food.



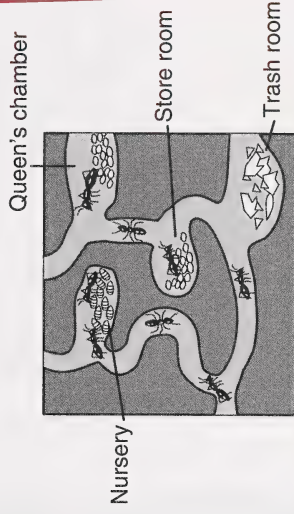
Flowers are nearby.



Flowers are far away.

Ants

Ants live together either underground or in hills. Taking care of the young is a full-time job. The workers feed the larvae and carry them outside in good weather. When the young ants hatch from the cocoon, they join the others building new tunnels and rooms, finding food, and cleaning out the nest (e.g., carrying out dead ants, old cocoons, and leftover food).





Writing Time

In the past sections, you've learned about insect habitats, body parts, life cycles, protection, and social behaviour. There's a lot to find out about these amazing creatures!

In this section, you will begin a research report on an insect of your choice.

Choose **one** insect to research and write about. If you find social insects interesting, you could research honeybees, ants, or termites.

You may need to visit your local library to find some books about insects. You may also look at encyclopedias or on the Internet.



STUDENT BOOK
Section 7
Writing Time

Turn to your Student Book to gather information and make notes about your insect on the **Insect Information** sheet. In the next section, you can use these notes to complete your report.



Social Insects



Section 7: Project Time

Choices You Have

- Complete a bee experiment.
- or
- Start an ant village.

Project Choice 1

Trained Honeybees

Subject: Science

Purpose: to complete an experiment and record observations

Honeybees have to make about 80 000 trips to flowers to make enough honey to fill a jar. They don't have time to waste!

As you will find out in this experiment, bees communicate to each other exactly where to find food.

Warning: Bees can sting—usually to protect themselves. Ask a grown-up to help you with this experiment.

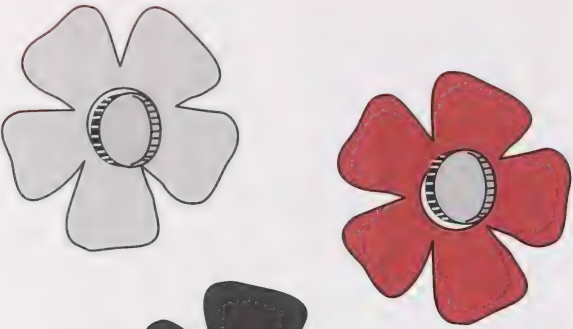
What You Need

- coloured construction paper
- five identical bottle tops
- sugar

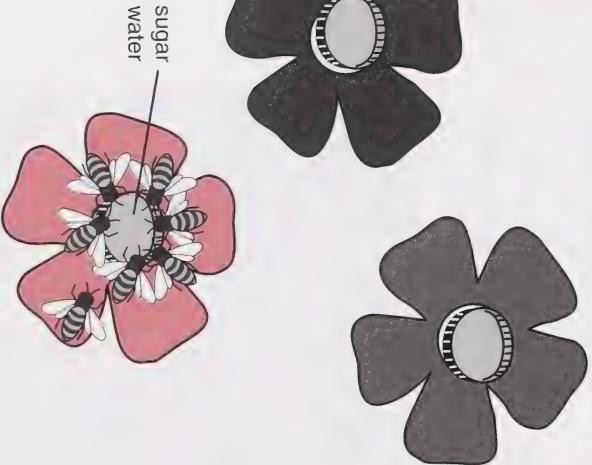
What You Do

1. Dissolve some sugar in a bit of water.
2. Cut out five flower shapes from different-coloured construction paper, and place them on a table outside.
3. Put a bottle cap in the centre of each “flower.” Fill one of them with sugar water. Move away from the table. Soon a bee will find the sugar water. What does it do?

4. After a while, the bee will leave. How long does it take for a group of bees to come to the flower? Do the bees go to any of the other flowers?

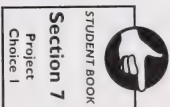


5. Now that you've trained your bees to come to a certain colour, test how they find food. First, take away the bottle caps from all the flowers. Then put sugar water on a flower of the same colour, some distance away. Do the bees fly to the new flower?



6. Move the sugar water to a different-coloured flower on the table. Do the bees find it?

7. Turn to your Student Book to write about this experiment.



STUDENT BOOK
Section 7
Project
Choice 1



Ant Village*Subject: Science**Purpose: to construct and observe an insect habitat*

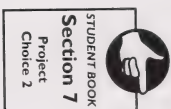
If you can't go outdoors to study social insects, you can study them inside. Watching how ants build their colonies is very interesting.

- a 4-L jar
- a small garden trowel or large spoon
- a piece of wood or a container that will fit in the jar
- a resealable plastic bag
- a stick pin
- a knee-high nylon stocking
- a large elastic band or rubber jar ring
- food, such as a cookie or cracker

1. Use the stick pin to make several small holes near the top of the plastic bag.
2. Take the piece of wood or the small container and place it in the centre of the jar.
3. Find an anthill. Take the plastic bag and shovel to it.
4. Use the shovel or spoon to stir the top of the anthill. When the ants start to come out, quickly use the shovel to scoop the soil and the ants into the plastic bag. Seal the bag.



5. Take the bag and carefully empty it into the jar. Be sure to catch any ants that try to get out of the jar.
6. Put some crumbled cracker or cookie on top of the soil.
7. Quickly put the stocking over the mouth of the jar. Then put the elastic band over the stocking to hold it in place.
8. Watch the ants build tunnels in their new colony.
9. Turn to your Student Book to comment on your colony.
10. When you have finished observing the ants, return them to the anthill. Be careful not to harm the ants when you put them and the soil back.



Section 8

Friends or Enemies?



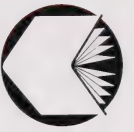
Section 8: Discovery Time

Activities You Will Do

- Read about helpful and harmful bugs.
- Write your insect report.

Most insects are harmless and only want to go about their own lives. Some insects are helpful to people. Other insects cause problems—especially when they make people sick or eat crops planted for humans. In this section, you'll find out about helpful and harmful insects.





Reading Time

Insects are a part of life. Sometimes they are helpful, and sometimes they are not-so-helpful. Read about insect friends and enemies in the fact box called “Helpful or Harmful?”

Check on the insects in your collection or bug home. Do they need anything to eat or drink?



Talking It Over

Talk over the following questions with your home instructor.

1. Which insects in your backyard would you consider helpful? harmful? Why?
2. How are insects controlled in your area? Do you agree with this method? Why or why not?
3. If insects disappeared from the world, how would this affect other living things?



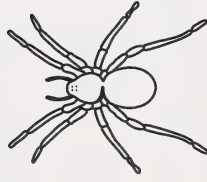
Helpful or Harmful?

What would the world be like without insects? There would be no mosquitoes to bite you, no flies to spread germs, and no tent caterpillars to eat all the leaves on trees. Sounds good so far, doesn't it?

There would also be no beautiful butterflies, no fruit, no cotton, and no honey. Because many fish, birds, and other animals need insects for food, they would die without them.

Here are some things that insects do that are **useful**:

- spread pollen so plants can produce fruit, seeds, and vegetables
- break down rotting wood and plant matter into soil
- provide honey, wax, silk, lacquer, and certain dyes and drugs
- clean up dead animals and animal dung
- eat many insect pests



Some insects, however, cause a great deal of harm. Here are a few of the **harmful** things they do:

- spread serious diseases (e.g., malaria, yellow fever, sleeping sickness, bubonic plague, typhoid, cholera, diphtheria, and dysentery)
- eat plants in the garden and cause damage to farm crops and forests
- get into stored foods, such as flour and grains
- sting or bite, causing itching or pain

Some people use chemical poisons to kill off pests—but insects adapt to the poison over time! Meanwhile, the poisons are harmful to other animals, including helpful insects and humans.



Writing Time

Take out the **Insect Information** sheet you started in Section 7 in your Student Book.



Did you choose a helpful or harmful insect? Are there any new facts you can add to this sheet? If there are, do that now.

Now get ready to write your report. Do a written rough draft first.

Your report should include the following headings:

- Description (with a labelled diagram or a picture)
- Habitat
- Protection
- Food
- Life Cycle
- Harmful or Helpful?
- Bibliography (title and author)

Think of an interesting opening sentence to catch your reader's attention and a closing sentence to sum up your topic. When you have finished, check your work. Read over the questions in the **Writing Checklist** box. Make sure you can answer "Yes" to all the questions.

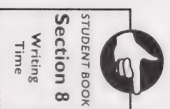
Writing Checklist

- ☐ Have I said everything I wanted to say?
- ☐ Does each sentence make sense?
- ☐ Does each sentence start with a capital letter?
- ☐ Does each sentence end with proper punctuation?
- ☐ Are all the words spelled correctly?

Turn to your Student Book to write your final edited copy. You will have extra time to finish this report in the next section, if you need it.



Write your report on a computer, if you have one. Insert the edited copy into your Student Book.



Friends or Enemies?



Section 8: Project Time

Choices You Have

- Match the name of the insect to its description.
- or
- Create a super bug that is either a hero or a villain.

Project Choice 1

Who Am I?

Subject: Science

Purpose: to identify an insect by its description; to determine whether an insect is a friend or an enemy

Some insects are harmful and some are helpful. See whether you can identify an insect from its description and then decide whether that insect is a friend or an enemy.

What You Do

1. Turn to the chart **Who Am I?** in your Student Book.



2. Match the description to the correct insect. Then indicate whether that insect is a friend or an enemy.



Project Choice 2

Super Bug!

Subjects: Language Arts/Creative Arts

Purpose: to create and describe a super bug (either hero or villain) using what you know about helpful and harmful bugs

In this project, you can use what you know about harmful and helpful bugs in a fun, creative way. You will create your own super bug, much like you would see in a movie or comic strip.

What You Need

- coloured and lead pencils
- blank and lined paper

What You Do

1. Choose an insect that is either helpful or harmful to be your super bug.

2. Give your super bug a name. The name should include a first name, a word that describes the insect, and the name of the insect. Try using **alliteration** (having each word begin with the same sound).

For example, the name of a super bug who is a villain could be Willy the Wicked Weevil.

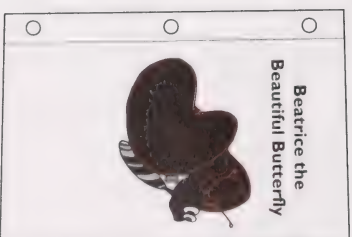
3. Make a list of characteristics your super bug could have. A villain would have bad characteristics, and a hero would have good characteristics.

4. Then write a description of what your super bug does. For example, *Willy the Wicked Weevil sneaks around waiting for a chance to steal grain.*

5. Now that you've created a super bug, do the following:

- Draw a picture of your super bug.
- Write a short story or comic strip describing an adventure your super bug had. Remember, your super bug is either a hero or a villain. Use the list of characteristics to help you describe the adventure.

6. Label your project **Section 8, Project Choice 2: Super Bug**. Then put the pages in your Student Book.



Section 9

A Place in Nature



Section 9: Discovery Time

Activities You Will Do

- Talk about insects.
- Complete a bug chart.
- Do a crossword puzzle.

So far in this module, you've been finding out many different things about insects. All of these things help to tell you what insects are. The most important thing to remember is that, like people, insects have a special place in nature. Insects and people live together and share this world.

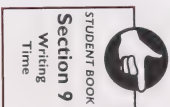




Writing Time

Take extra time now, if you need it, to finish your **Insect Information Report** from the last section.

Turn to your Student Book to have some fun doing a crossword puzzle.

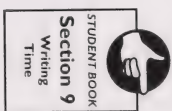


STUDENT BOOK
Section 9
Writing Time

Now it is time to look back and tell your teacher how you've become an **entomologist**—an insect expert!

You'll be able to explain the differences between an insect and a non-insect and why insects are important in nature. You'll also be able to discuss insect habitats, body parts, life cycles, and protection.

Turn to your Student Book to complete the **All About Bugs** chart.



STUDENT BOOK
Section 9
Writing Time

Now that you have finished this module, you need to return the insects in your collection or bug home to their natural habitat. Take time now to put them back where you found them.





Exploring Time

Nature Hunt

Nature is like a puzzle. Every small piece is important. For example, without plants, most insects couldn't survive. Yet, without insects, most plants couldn't survive either!

Invite your friends and family on a scavenger hunt to look for different things in nature. In this hunt, you won't be collecting anything. You'll leave nature in its place and use a checklist to record what you see.

Pass out pieces of paper and some pencils. Invite people to pair up into teams. Then have them write a list of things to look for on the hunt.

Here are some suggestions:

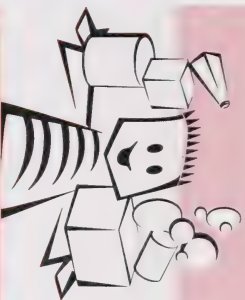
- a flower
- a chewed leaf
- something fuzzy
- wood with insect holes
- pollen
- a feather
- an insect with camouflage
- a social insect
- something that makes noise
- an insect habitat
- a bug that is not an insect

Check off things as they are found. Set a time limit for the scavenger hunt. The team that discovers the most things on the list wins.

Label your checklist **Section 9, Exploring Time** and put it into your Student Book.



A Place in Nature



Section 9: Wrap-up Time

Final Activities You Will Do

- Discuss what you have learned.
- Gather your work and organize your Student Book.
- Play some bug games.

You've come to the end of this module. Congratulations!

What a lot of interesting work you have done. It's not the end of your learning about bugs, though. Observe bugs every time you go out into your backyard! Watch them as they go about their busy lives. You'll find there are still many interesting things to discover about these small creatures!



Talking It Over

Discuss what you worked on and what you learned in this module with your home instructor. You can write your answers on a piece of paper, or you can record your answers on tape. Use the following questions as a guide:

- What was your favourite part of *Backyard Bugs*? Why was it your favourite?
- Was there a part you found difficult? Why was it difficult? What would have made it easier?
- What did you learn about bugs that you didn't know before?
- Will you keep studying bugs in the future? Why or why not?

If you've recorded your comments on tape, punch three holes along one of the long edges of a large envelope, label it, and put your audiotape in it.

Put the envelope with your tape or your paper copy of your comments in your Student Book.

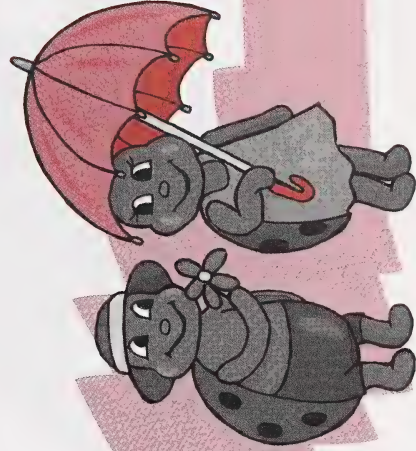


If you have a computer, prepare your final copy on it. Then punch three holes on the edge of the paper, and put it into your Student Book.



Gather Your Work

Carefully look through each page of your Student Book from start to finish. You should include all the pages of the Student Book with the following icon as well as any additional pages you have done on your own paper.



Bug Fun

Here are some games about bugs. Try them out when you have some free time with family and friends. The more people there are to join in, the more fun it will be!



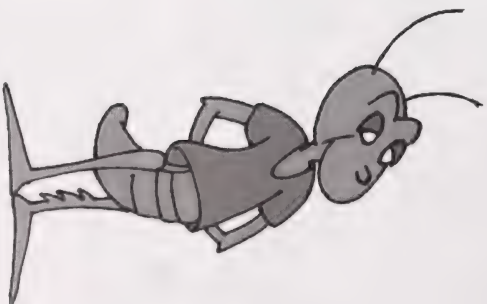
Insect Trivia

Here's a game to impress your friends and family with how much you know about insects.

1. Make up 10 to 12 trivia cards. Carefully print or write a question on one side of a piece of cardboard or an index card. Put the answer on the other side.
3. Design the game board on a piece of cardboard or an open file folder. Use one of your favourite board games for ideas.
4. Make markers from different-coloured buttons, coins, or bottle caps.
5. Play the game, following the rules. Have fun!

2. Write down the rules explaining the following:

- the purpose of the game
- the number of players
- how players should take their turns
- how the game ends
- who the winner is



Six-Legged Race

Can you imagine how complicated it must be for an insect to walk with six legs? You can try walking with more than two legs—if you join up with a friend or two!

Find two friends and go to an open area. Start with one friend. Use a scarf or cloth to tie one of your legs to your friend's leg. Try walking. You'll see how important it is to find your balance!

Then try again, tying another friend's leg to your other leg. Try to walk across the area without falling down! If enough people are available, you can hold a race.

Backyard Bug

This is a drawing game to play with a die. Players see who can be the first to draw all the parts of an insect. (The drawing is not supposed to be perfect.) Take out some pencils, paper, and a die.

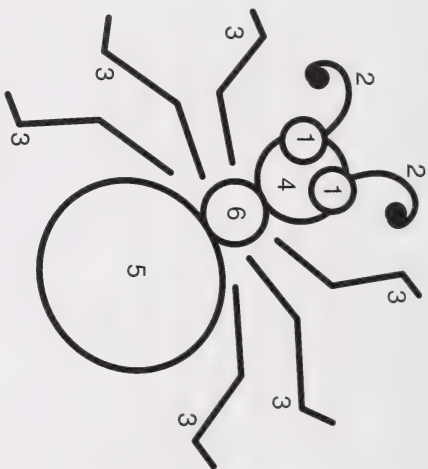
Decide who will start. That player throws the die to see which part to draw. All players must start with a main body part. So she or he must throw a 4, 5, or 6 to get started. Then another player takes a turn.



Here is the guide:

- 6 thorax
- 5 abdomen
- 4 head
- 3 leg
- 2 antenna
- 1 eye

If a player has already drawn a thorax and throws another 6, then she or he loses the turn. If a player throws a 1 or a 2 and only has a thorax, she or he loses the turn, too (because an eye or an antenna cannot be drawn on a thorax). If that player throws a 3, 4, or 5, then she or he can add the body part to the thorax.



Credits

Some clip art drawings are commercially owned.

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Special Interest
Module
Mini Module Booklet
Backyard Bugs
2000